REMARKS

This Amendment is in response to the Office Action dated April 7, 2006. In the Office Action, the Examiner rejected claims 1, 2, 4-6 and 8 under 35 U.S.C. § 103(a) as being unpatentable over Mahoney, U.S. Patent No. 5,193,125 (hereinafter *Mahoney*), in view of Munro *et al.*, US Publication 2002/0089549 (hereinafter *Munro*). Claims 3 and 7 were rejected under 35 U.S.C. § 103(a) as being unpatentable over *Mahoney* in view of *Munro*, and further in view of Jones, US Publication 2003/0100969 (hereinafter Jones).

Claims 1-3 and 5-7 are amended as shown above. Specifically, these claims are amended to more clearly recite features of the claimed invention. No claim amendments are made in view of the cited art. Accordingly, no prosecution history estoppel should apply to such claim amendments. New Claims 9-19 have been added. Claims 1-19 are now pending in the application. For the reasons set forth below, the Applicants respectfully request reconsideration and allowance of all pending claims.

CLAIM REJECTIONS - 35 U.S.C. § 103

Claims 1, 2, 4-6 and 8 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Mahoney* in view of *Munro*. Claims 3 and 7 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Mahoney* in view of *Munro*, and further in view of Jones. Applicant respectfully asserts that each of these rejections is improper, and should be withdrawn.

To establish a *prima facie* case of obviousness, there must first be some suggestion or motivation to modify a reference or to combine references, and second be a reasonable expectation of success. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure. Third, the prior art reference (or references when combined) must teach or suggest all the claim limitations. M.P.E.P. § 706.02(j) from *In Re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). Where claimed subject matter has been rejected as obvious in view of a combination of prior

art references, a proper analysis under § 103 requires, *inter alia*, consideration of two factors: (1) whether the prior art would have suggested to those of ordinary skill in the art that they should make the claimed device; and (2) whether the prior art would also have revealed that in so making, those of ordinary skill would have a reasonable expectation of success. Both the suggestion and the reasonable expectation of success must be founded in the prior art, not in the Applicants' disclosure. *Amgen v. Chugai Pharmaceutical*, 927 F.2d 1200, 18 USPQ2d 1016 (Fed. Cir. 1991), *Fritsch v. Lin*, 21 USPQ2d 1731 (Bd. Pat. App. & Int'f 1991). An invention is non-obvious if the references fail not only to expressly disclose the claimed invention as a whole, but also to suggest to one of ordinary skill in the art modifications needed to meet all the claim limitations. *Litton Industrial Products, Inc. v. Solid State Systems Corp.*, 755 F.2d 158, 164, 225 USPQ 34, 38 (Fed. Cir. 1985).

The examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references. M.P.E.P. § 70602(j) from *Ex parte Clapp*, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985). Obviousness cannot be established by combining references without also providing evidence of the motivating force which would impel one skilled in the art to do what the patent applicant has done. M.P.E.P. § 2144 from *Ex parte Levengood*, 28 USPQ2d 1300, 1302 (Bd. Pat. App. & Inter. 1993) (emphasis added by M.P.E.P.).

Discussion of *Mahoney*

Mahoney concerns a local hierarchical processing focus shift within an image that employs techniques that analyze an image by operating on regions of the image. As described in the Abstract, *Mahoney* discloses,

> And [*sic*] in-place hierarchical technique shifts a spatial processing focus within a two-dimensional array in a SIMD parallel framework. The hierarchical process uniquely associates a rectangular region with each image location at each level of the hierarchy. Each of these regions at a given level is the union of two child regions at the next lower level, one of

which is associated with the same image location. In an upward pass, an occupancy bit is stored at each location at each level of the hierarchy, indicating whether the respective region at that level includes any pixels that meet a specified criterion for selecting the new processing focus. In a downward pass, the focus is shifted at each step to a pixel associated with one of the child regions of the region associated with the focus, the child region's occupancy bit being on. This involves a random or arbitrary choice between the two children when both of their occupancy bits are on. The scheme is uniform, local, and parallel; it is particularly efficient because the array contents are never accessed by the central processor.

The technique disclosed by *Mahoney* is directed toward the problem of shifting focus on an SIMD (Single Instruction stream, Multiple Data streams) machine. As stated in the Summary of the Invention (Col. 1, line 57 to Col. 2, line 3),

> A problem arises in shifting focus on a SIMD machine, because the choice of the next pixel must not require the central controller to access the contents of a currently selected processing unit, as such access would itself require a pass through the hierarchy.
>
> This aspect is further based on the recognition that this problem can be solved by performing the downward pass through the array of pixel data items, shifting the data items in the array in such a way that the information necessary to choose the next pixel is locally available at the pixel data item that is the current focus. The data item is shifted so that the current focus data item includes data indicating which of its children meets the new focus criterion. If both do, a local choice can be made between the children.

With respect to the rejection of claims 1 and 5, the Examiner states,

> Mahoney suggests tracing a topology ... binary branches. For example, Mahoney discloses a local hierarchical processing focus shift within an image, with analysis of fragments of a two-dimensional binary image, each of whose pixels can be designated as (m,n) coordinates (col 4, lines 10-15).

Claim 1 has been amended to more clearly recite features of the claimed invention, and now recites,

1. A method to express a topological structure of an object in an image including a plurality of binary branches, comprising:

tracing the plurality of binary branches; and

as the plurality of binary branches are traced, generating an extended markup language (XML) file including elements and having a nesting structure describing the topology structure of the object.

Applicant respectfully asserts that it is clear the *Mahoney* does not teach or suggest the operation of "tracing the plurality of binary branches." Specifically, *Mahoney* does not employ a tracing technique, but rather employs a hierarchical process using a focus shift processing technique at each level of the hierarchy. The technique is discussed with reference to Figs. 4-7 and exemplary bitmap pattern in Fig. 2. At the first level of the hierarchy, only pixels in a single column are evaluated, one column at a time. A first pass is made from the bottom of each column to the top of the column to determine if an adjacent pixel meets the focus shift criteria. A downward pass is then made, again on a column by column basis. The result of the upward pass are shown by array 100, which shows a 1 for a colored (black) pixel, and a 0 for a white pixel. A similar upward and then downward pass is employed for progressively larger blocks of pixels, with the N^{th} level considering 2^{N-1} pixels. In further detail,

> FIG. 5 illustrates arrays of bit vectors produced by an upward hierarchical pass using the in-place implementation. The final array can then be used during the downward pass in determining which subregion includes a pixel that meets the new focus criterion.
>
> Array 100 is the lowest level of the hierarchy, and includes, for each pixel, a bit indicating whether the pixel meets the new focus criterion. The bits of array 100 are obtained by applying a black pixel criterion to array 30 in FIG. 2. Numerous other criteria would be appropriate, of course, such as a criterion that a pixel have a value that is salient in relation to the global distribution of a given attribute.
>
> Array 102 is the second level of the hierarchy in which each pixel's vector includes a second bit indicating whether the rectangular two-pixel region including the pixel and the first pixel below it includes a pixel meeting the criterion. Similarly, in array 104, each pixel's vector includes a third bit indicating whether the square four-pixel region including the pixel's rectangular two-pixel region and the rectangular two-pixel region of the first pixel on its right includes a pixel meeting the criterion. The fourth bit in array 106 indicates whether a rectangular eight-pixel region includes

a pixel meeting the criterion and the fifth bit in array 108 indicates whether a square 16-pixel region includes such a pixel.

It is clear that this technique does not trace any topology (*e.g.*, plurality of branches of an object) at all. Rather, the technique employs evaluation of progressively larger subregions within image bitmap. Clearly, the element of "tracing the plurality of binary branches" is not taught or suggested by *Mahoney*.

With respect to the element of, "simultaneously generating extended markup language (XML) elements to generate an XML document having a nesting structure describing the topology structure of the object" in original claim 1, the Examiner asserts that while *Mahoney* does not expressly teach this element it is suggested by *Munro*. Applicants respectfully assert that this is incorrect.

This claim element has been amended to now recite, "as the plurality of binary branches are traced, generating an extended markup language (XML) file including elements and having a nesting structure describing the topology structure of the object." For the purpose of the teaching or suggestion of this element (as asserted in the instant Office Action), the amended version of this element is analogous to the original version. Applicant respectfully asserts this element is clearly not taught or suggested by *Munro*.

In support of the suggestion of the original version of this claim element, the Examiner states, "For example, Munro discloses image having a hierarchical structure (*i.e.*, a natural bitmap image) with vectors where the folder of graphical objects and images may be represented in XML by PIXML tag (paragraph 43)."

Munro generally relates to displaying multiple images that are independently manipulatable in a single window (Field of the Invention). The technique disclosed by *Munro* are implemented via a multiple-image viewer. As stated in paragraph [0043],

> The multiple-image viewer allows for images to be comprised of a hierarchical system of folders 704. The multiple-image viewer uses two basic objects an image and a folder. A folder is a container that can hold, and thus display, one or more images. *An image may be a raster graphic (i.e. natural bitmap image) or other similar file.* A raster graphic differs from a vector graphics in the way that a computer interprets the image

data file. A vector graphic defines a picture as points, lines and other geometric entities. The points, lines and other geometric entities generally define an object. The combination of all the individual objects usually creates the vector graphics image. *A raster graphic represents a picture image as a matrix of dots known as pixels. The computer generally views the combination of all of the pixels to comprise the image.* Dozens of raster (natural bitmapped) graphics formats exist, including GIF, TIF, BMP, JPG and PCX. The image may be encoded with compression technology and with multi-resolution random access capability. Both a folder and an image can have other content associated with them. Both images and folders can contain content such as images, graphics objects, sub folders, tiled and non-tiled background images, a text document, a hyperlink, an image map, an image address or other similar content. *In an embodiment, each folder may be represented in XML by a <PIXML> tag.* (Emphasis added)

As stated in the PIXML Overview on page 9 of the appendix,

> In PIXML, a tree-like hierarchical architecture is used to organize and manage images over the Internet. *There are two basic objects used in PIXML: an image and a folder.* An image is a raster graphic (*i.e.*, natural bitmap image) encoded with PicSurf compression technology with multi-resolution random access capability. (Hierarchical Image Management section, emphasis added)

Under *Munro*, the XML documents do not include elements and have a nesting structure describing the topology structure of an object [in an image, wherein the object comprises a plurality of binary branches]." Rather, some of the XML elements correspond to different bitmaps having different resolutions of the same *image* (see, *e.g.*, Fig. 8). Furthermore, the hierarchical structure of XML elements correspond to the hierarchy of folders containing such elements (see, *e.g.*, Fig. 7), and have nothing to do with a structure of any object within any folders.

It is clear from above the *Munro* does not teach or suggest the element of "... generating an extended markup language (XML) file including elements and having a nesting structure describing the topology structure of the object." Moreover, the combination of *Mahoney* and *Munro* do not teach or suggest the other aspect of this element, that being generating such an XML file "as the plurality of binary branches are traced."

It is clear that the combination of *Mahoney* and *Munro* fail to teach or suggest all the claim limitations of claim 1, as required by the third prong of the *In Re Vaeck* test. Furthermore, the Examiner has failed to identify any motivation found in either reference to suggest combining them to obtain the invention of claim 1, nor would there be any expectation of success. As stated above, Obviousness cannot be established by combining references without also providing evidence of the motivating force which would impel one skilled in the art to do what the patent applicant has done. M.P.E.P. § 2144. Both the suggestion and the reasonable expectation of success must be founded in the prior art, not in the Applicants' disclosure. *Amgen v. Chugai Pharmaceutical*. An invention is non-obvious if the references fail not only to expressly disclose the claimed invention as a whole, but also to suggest to one of ordinary skill in the art modifications needed to meet all the claim limitations. *Litton Industrial Products, Inc. v. Solid State Systems Corp.* The motivation to combine the *Mahoney* and *Munro* references stated by the Examiner are based, in part, on the false premise that *Munro* represents objects in XML. While objects can be represented in XML, there is no teaching in *Munro* to do so, as discussed above. Nor would there be any expectation of success.

In summary, it is clear that the combination of *Mahoney* and *Munro* fail to meet the requirements of all three prongs of the *In Re Vaeck* test. Accordingly, independent claim 1 is clearly patentable over the cited art. Moreover, since each of claims 2-4, as well as new claims 9-11, are either directly or indirectly dependent on independent claim 1, each of these claims is patentable for at least the same reasons as claim 1.

With further respect to the rejection of claim 2, Applicant respectively asserts that neither *Mahoney* or *Munro*, alone or in combination, teach or suggest each and every one of the elements,

generating a bitmap skeleton of the object;

tracing the bitmap skeleton from a suitable end point on the skeleton;

recursively selecting adjacent pixels of the bitmap skeleton to identify lines, nodes and endpoints; or

adding line and grouping elements to the XML file based on the lines, nodes and endpoints that are identified.

In support of the rejection of claim 2, the Examiner asserts that a natural bitmap image is equivalent to a bitmap skeleton (when viewed in its broadest reasonable interpretation). If this was the case (*i.e.*, the natural bitmap image was a bitmap skeleton), there would be no need to generate a bitmap skeleton.

As discussed above, *Mahoney* does not trace anything, much less trace a bitmap skeleton. Moreover, *Mahoney* does not recursively select adjacent pixels of such a bitmap skeleton to identify lines, nodes, and endpoints. Additionally, neither lines or grouping elements are added to any XML file under *Munro* based on lines, nodes, and endpoints that are identified (via any technique, much less identified by tracing a bitmap skeleton).

Clearly, claim 2 is patentable over the combination of *Mahoney* and *Munro*.

With further respect to claim 4 (still in its original form), this claim recites,

4. The method of claim 1, wherein the XML file that is generated is used to store attributes representing physical properties of the topology structure without requiring a location referencing system.

In support of the rejection of claim 4, the Examiner asserts that this element is suggested by *Munro*, stating,

> For example, an XML document defining bitmap images with an image database (para 4, 27,33) with images stored in any array without expressly storing pixel locations, rather relying on other properties.
>
> It would have been obvious to one or ordinary skill in the art at the time of the invention to modify Mahoney to include an image array structure where XML document defines the bitmap images with an image database as disclosed in Munro, providing the benefit of displaying and manipulating multiple images, in a single window, over a network, which overcomes the disadvantage of being slow and inefficient (Munro, para 5 and 8).

While the immediate foregoing paragraph may or may not be true, it has nothing to do with combining *Mahoney* and *Munro* to obtain the elements and limitations of claim 4, but rather combining *Mahoney* and *Munro* to improve *Munro* (or otherwise improvements addressed by *Munro*). Clearly, claim 4 is patentable over the combination of *Mahoney* and *Munro*.

With further respect to claim 3, the original version of this claim was rejected as being unpatentable over *Mahoney* in view of *Munro*, and further in view of Jones. Claim 3, as amended, now recites (with amendments shown),

3. The method of claim 2 where the adding of line and grouping elements to the XML file further comprises:

adding a line element as a child of a grouping element;

adding a transform attribute to the grouping element with rotation and translation properties, wherein the translation value is <u>indicative of</u> the length of the parent line and the rotation values is <u>indicative of an</u> [[the]] angle the parent line would be rotated to align with the child line; <u>and</u>

adding an attribute to the line element with a value equal to the length of the child line.

With respect to the rejection of original claim 3, the Examiner asserts the claim limitations are suggested by Jones. In support of this assertion, the Examiner states,

For example, Jones discloses coordinating Haptics with visual images in a human-computer interface where objects is represented in the image as a rotated and titled relative to the viewer (paragraph 6). The examiner interprets the claims with their broadest reasonable interpretation for drawing an object and thereafter rotating and reference suggests the conceptual interpretation. For example, scaling, rotation and (x,y,z) position of each object using a program where the 2-D object is rotated (paragraph 47).

Applicant notes that Jones does not employ XML for any purpose, and further clearly does not teach or suggest the any of the limitations of claim 3. Accordingly, claim 3 is patentable over the combination of *Mahoney* and *Munro*.

With respect to claims 5-8, these claims are Beauregard claims that claim software for performing method operations analogous to those recited in claims 1-4, respectively. Accordingly, each of claims 5-8 is patentable over the combination of *Mahoney* and *Munro* for similar reasons to those presented above in support of the patentability of claims 1-4. In addition, each of new claims 12-15, which depend either directly or indirectly from independent claim 5, are in condition for allowance for at least the same reasons as presented above for claim 1.

Applicant respectfully asserts that new claim 16 is clearly patentable over the cited art of record. For example, new claim 16 includes several elements that are analogous to similar elements recited in claims 1-3. Additionally, each of new claims 17-19, which depend from claim 16, are patentable for at least the same reasons as claim 16.

Conclusion

Overall, none of the references singly or in any motivated combination disclose, teach, or suggest what is recited in the independent claims. Thus, given the above amendments and accompanying remarks, independent claims 1, 5, and 16 are now in condition for allowance. The dependent claims that depend directly or indirectly on these independent claims are likewise allowable based on at least the same reasons and based on the recitations contained in each dependent claim.

If the undersigned attorney has overlooked a teaching in any of the cited references that is relevant to the allowability of the claims, the Examiner is requested to specifically point out where such teaching may be found. Further, if there are any informalities or questions that can be addressed via telephone, the Examiner is encouraged to contact the undersigned attorney at (425) 562-0923.

Respectfully submitted,

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